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PATENT ABSTRACTS OF JAPAN

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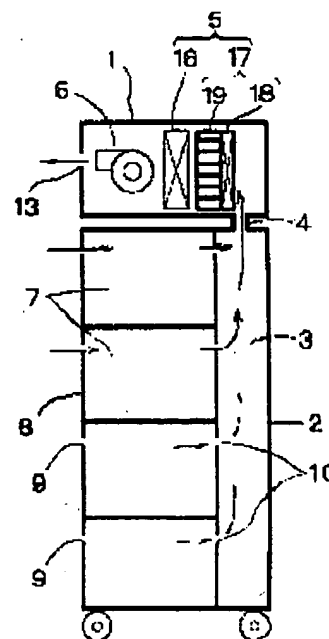
KIMURA TOSHIO

(54) DEODORIZING APPARATUS FOR BREEDING SHELF

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a deodorizing apparatus capable of efficiently deodorizing foul odor emitting from the body and feces of an animal held in each partitioned chamber of a breeding shelf, having compact size, facilitating the maintenance work and enabling the deodorizing work at a low cost.

SOLUTION: A blowing means 6 is connected to the exhaustion port 4 and/or the air-supplying port of a breeding shelf 2 to effect the ventilation in the breeding shelf 2. An air-cleaning unit 5 provided with a honeycomb activated carbon filter 19 and an HEPA filter 16 is connected to the exhaustion port 4 and/or the air-supplying port.



LEGAL STATUS

[Date of request for examination]

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CLAIMS

[Claim(s)]

[Claim 1] Deodorization equipment of the breeding shelf which connects a ventilation means (6) with either at least, constitutes possible [ventilation of the inside of a breeding shelf (2)], and is characterized by the thing of the exhaust port (4) of a breeding shelf (2), and an air supplying opening (23) for which the air cleaning unit (5) of the above-mentioned exhaust port (4) and an air supplying opening (23) which equipped either with the honeycomb-like charcoal filter (19) and the HEPA filter (16) at least was connected.

[Claim 2] Deodorization equipment of the breeding shelf according to claim 1 which has arranged the filter for dust removing (18) from the honeycomb-like charcoal filter (19) to the upstream within the above-mentioned air cleaning unit (5).

[Claim 3] Deodorization equipment of the breeding shelf according to claim 2 which equipped with the above-mentioned filter for dust removing (18) free [attachment and detachment] into the air cleaning unit (5).

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention can deodorize efficiently the unpleasant smell generated from the body and feces and urine of the animal held in each compartment of a breeding shelf in more detail about the deodorization equipment of the breeding shelf for holding and breeding a laboratory animal etc., moreover, it is compact, and is easy to maintain, and relates to the equipment which can be carried out cheaply.

[0002]

[Background of the Invention] On the breeding shelf which holds laboratory animals, such as a rat, a mouse, a guinea pig, and a rabbit What was made the configuration which supplies pure air in a breeding shelf, maintains the inside of a breeding shelf to positive pressure, prevents the inflow of the open air, and is suitable for clarification breeding of an SPF animal, a nude mouse, etc. (henceforth a positive pressure mold breeding shelf). What was made the configuration which attracts the air in a breeding shelf, maintains the inside of a breeding shelf to negative pressure, purifies exhaust air, and is suitable for quarantine isolation of Tg (transgenic) animal etc. (henceforth a negative pressure mold breeding shelf), The inside of a breeding shelf is sealed certainly, an inflow and outflow of the open air are prevented, and while supplying pure air into a breeding shelf, there are some (henceforth a closed mold breeding shelf) which were made the configuration which purifies the exhaust air from a breeding shelf and is suitable for infection breeding using an SPF animal or a nude mouse etc.

[0003]

[Description of the Prior Art] As equipment which purifies ventilation of the above-mentioned breeding shelf, conventionally For example, if it is in the negative pressure mold breeding shelf (51) shown in drawing 9, it is to an air supplying opening (52) (if it is in a positive pressure mold breeding shelf, to an air supplying opening).

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TECHNICAL FIELD

[Field of the Invention] This invention can deodorize efficiently the unpleasant smell generated from the body and feces and urine of the animal held in each compartment of a breeding shelf in more detail about the deodorization equipment of the breeding shelf for holding and breeding a laboratory animal etc., moreover, it is compact, and is easy to maintain, and relates to the equipment which can be carried out cheaply.

[0002]

[Background of the Invention] On the breeding shelf which holds laboratory animals, such as a rat, a mouse, a guinea pig, and a rabbit What was made the configuration which supplies pure air in a breeding shelf, maintains the inside of a breeding shelf to positive pressure, prevents the inflow of the open air, and is suitable for clarification breeding of an SPF animal, a nude mouse, etc. (henceforth a positive pressure mold breeding shelf). What was made the configuration which attracts the air in a breeding shelf, maintains the inside of a breeding shelf to negative pressure, purifies exhaust air, and is suitable for quarantine isolation of Tg (transgenic) animal etc. (henceforth a negative pressure mold breeding shelf). The inside of a breeding shelf is sealed certainly, an inflow and outflow of the open air are prevented, and while supplying pure air into a breeding shelf, there are some (henceforth a closed mold breeding shelf) which were made the configuration which purifies the exhaust air from a breeding shelf and is suitable for infection breeding using an SPF animal or a nude mouse etc.

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PRIOR ART

[Description of the Prior Art] As equipment which purifies ventilation of the above-mentioned breeding shelf, conventionally For example, if it is in the negative pressure mold breeding shelf (51) shown in drawing 9, it is to an air supplying opening (52) (if it is in a positive pressure mold breeding shelf, to an air supplying opening). If it is in a closed mold breeding shelf, a blower (54) is connected to each of an air supplying opening and an exhaust port through an air cleaning unit (53). Some which have arranged the HEPA filter (high efficiency filter) (55) from which a particle 0.3 micrometers or more is removable 99.97% or more are in this air cleaning unit (53). In addition, to the upstream of this HEPA filter (55), the filter for dust removing (56) from which a particle 0.5 micrometers or more is removable 99.5% or more and which consists of a neutral ability air filter is arranged, and it constitutes so that the dust contained in air, such as hair of an animal, may be removed and the blinding of a HEPA filter (55) may be prevented.

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EFFECT OF THE INVENTION

[Effect of the Invention] Since this invention is constituted as mentioned above and acts, it does the following effectiveness so.

[0038] (b) It can be large, and a touch area with the air to pass can adsorb an unpleasant smell efficiently, and can deodorize, and a honeycomb-like charcoal filter can maintain little good work environment and the breeding environment of an unpleasant smell.

[0039] (b) Since the adsorption engine performance of a honeycomb-like charcoal filter is high, in the volume of a filter ending small, since pressure loss cannot produce blinding easily small, a ventilation means can demonstrate high ventilation capacity, can adopt a small ventilation means, and a honeycomb-like charcoal filter can constitute the whole equipment in a compact.

[0040] (c) Since it is not necessary to form a large-sized air conditioner etc. and since the air supply to a breeding shelf and the exhaust air from a breeding shelf are deodorized directly, and a ventilation means small as mentioned above can be adopted, facility cost and a running cost can be reduced and it can carry out cheaply.

[0041] (d) The honeycomb-like charcoal filter which adsorbed an unpleasant smell cannot be dust-ized, and can perform exchange to a new article etc. easily. And since it is the configuration which arranges a honeycomb-like charcoal filter and a HEPA filter to the air cleaning unit connected with the exhaust port and air supplying opening of a breeding shelf, in being easily applicable to the existing breeding shelf, the management for every breeding shelf is easy, and the fine maintenance according to a class, a trial mode, etc. of a rearing animal can be carried out easily.

[0042] (e) Within the above-mentioned air cleaning unit, since the air from which comparatively large-sized dust, such as hair of an animal, was removed passes a honeycomb-like charcoal filter when the filter for dust removing has been arranged to the upstream rather than the honeycomb-like charcoal filter, there is no possibility that a honeycomb-like charcoal filter may produce blinding with these dust, and a honeycomb-like charcoal filter can be used effectively for a long period of time.

[0043] (**) When it equips with the above-mentioned filter for dust removing free [attachment and detachment], only the filter for dust removing is exchangeable, continuing and using a honeycomb-like charcoal filter, it can continue further at a long period of time, and a honeycomb-like charcoal filter can be used effectively.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In the HEPA filter of the above-mentioned conventional air cleaning unit Although detailed pollutants, such as bacteria, are removed from exhaust air or air supply and air can be purified Cannot remove the unpleasant smell generated from the body and feces and urine of an animal, but when the exhaust air from a breeding shelf circulates to a breeding shelf again through an air cleaning unit, the breeding trial interior of a room in which the interior of a breeding shelf and a breeding shelf were installed will be filled with the above-mentioned unpleasant smell. There is a problem on which the work environment of an experiment and the breeding environment of an animal get worse.

[0005] Although it is possible to arrange pellet type activated carbon for this ventilation path, and to carry out adsorption treatment of the above-mentioned unpleasant smell to it while ventilating the air of the breeding trial interior of a room which laid the breeding shelf since this is canceled, the large-sized air conditioner which can ventilate the air of the whole breeding laboratory needs for this, and the problem which not only facility costs, such as piping, but the running cost which operates a large-scale ventilation means attaches at an expensive price is. Moreover, a large-scale ventilation means is needed for needing a lot of activated carbon for fully adsorbing an unpleasant smell by these activated carbon, and there being a problem which an air cleaning unit large-sized-izes, and securing a required gas exchange, since the ventilation resistance of these activated carbon is large although arranging a pellet type and which fibrous activated carbon to the above-mentioned air cleaning unit, and removing an unpleasant smell is also considered, and it cannot carry out cheaply. And in the filter packed bed of granular active carbon or activated carbon fiber, it is easy to cause channeling of gas and the problem which is not used effectively also has the adsorption engine performance of activated carbon.

[0006] This invention cancels the above-mentioned trouble and can deodorize efficiently the unpleasant smell generated from the body and feces and urine of the animal held in each compartment of a breeding shelf, and moreover, are compact, and a maintenance is easy and let it be a technical technical problem to offer the deodorization equipment which can be carried out cheaply.

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MEANS

[Means for Solving the Problem] If this invention is explained based on drawing 8 from drawing 1 which shows the gestalt of operation of this invention in order to solve the above-mentioned technical problem for example, it constitutes the deodorization equipment of a breeding shelf as follows. That is, this invention is characterized by the thing of the exhaust port (4) of a breeding shelf (2), and an air supplying opening (23) for which the ventilation means (6) was connected with either, at least, it constituted possible [ventilation of the inside of a breeding shelf (2)], and the air cleaning unit (5) of the above-mentioned exhaust port (4) and an air supplying opening (23) which equipped either with the honeycomb-like charcoal filter (19) and the HEPA filter (16) at least was connected.

[0008] In addition, with any the above-mentioned ventilation means and an air cleaning unit shall be connected between an exhaust port and an air supplying opening according to the format of a breeding shelf differ. That is, if a ventilation means and an air cleaning unit are connected with an exhaust port, and the inside of a breeding shelf is held at negative pressure, if it is in a negative pressure mold breeding shelf, and it is in a positive pressure mold breeding shelf, a ventilation means and an air cleaning unit are connected with an air supplying opening, the inside of a breeding shelf is held at positive pressure, and if it is in a closed mold breeding shelf, a ventilation means and an air cleaning unit are connected with both exhaust port, and both [either or].

[0009] The HEPA filter and honeycomb-like charcoal filter with which the above-mentioned air cleaning unit was equipped may arrange any to the upstream of a ventilation path. 20-1000 things which have 50-900 cel holes can be preferably used for the 10-1500 above-mentioned honeycomb-like activated carbon per 1 square inch still more preferably, and a urea, iodine, an inorganic iodide, a metal iodide, an acid, a bromine, platinum group metals, etc. may be independent, or may be combined suitably, and may make the drugs for raising the adsorption engine performance support if needed. In addition, as gas circulation conditions over the above-mentioned honeycomb-like charcoal filter, although linear velocity is [second] 0.3-1m/second desirably 0.1-2m /and depends processing airflow on the magnitude of a breeding shelf, the class of hold animal, etc., it is usually a part for 0.5-3m3/desirably by 0.1-5m3/.

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OPERATION

[Function] The air in a breeding shelf is discharged by the drive of the ventilation means which the open air was sent in by the drive of the ventilation means connected with the air supplying opening of a breeding shelf into the breeding shelf, and was connected with the exhaust port of a breeding shelf, and, thereby, the air in a breeding shelf is ventilated. At this time, the air sent into a breeding shelf by the air cleaning unit connected with the air supplying opening is purified, and the air discharged from a breeding shelf by the air cleaning unit connected with the exhaust port is purified. That is, detailed dust, detailed bacteria, etc. in air are removed by the HEPA filter, and adsorption treatment of the unpleasant smell in air is carried out with a honeycomb-like charcoal filter.

[0011] Much micropores are formed, for example, the above-mentioned honeycomb-like charcoal filter cannot produce blinding easily compared with pellet type activated carbon etc. the top where pressure loss is as small as [about] 1/10, and a ventilation means can demonstrate high ventilation capacity. And since it passes the air which passes a honeycomb packed bed not having channeling, and contacting the honeycomb-like activated carbon of a large area by the uniform rate of flow, since it is a honeycomb-like, even if it is in a quick space velocity, adsorption treatment of the unpleasant smell is carried out efficiently. And the honeycomb-like charcoal filter which fully adsorbed this unpleasant smell is exchanged for a new honeycomb-like charcoal filter, not dust-izing by adsorption and holding the original configurations, such as a block object and a plate.

[0012] In addition, when an air cleaning unit is connected only with an air supplying opening, the air containing the unpleasant smell generated on the breeding shelf is exhausted as it is, but since it is deodorized in the above-mentioned air cleaning unit when circulating the open air containing this unpleasant smell into a breeding shelf again, it accumulates or is not filled with an unpleasant smell in a breeding shelf etc. Since the exhaust air from a breeding shelf is deodorized certainly and the air of the perimeter of a breeding shelf can be maintained in the good condition that there is no unpleasant smell, on the other hand when the above-mentioned air cleaning unit which has arranged the above-mentioned honeycomb-like charcoal filter is connected with the exhaust port of a breeding shelf, it is more desirable.

[0013]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the conceptual diagram showing the structure of the deodorization equipment of a breeding shelf of the 1st operation gestalt which applied this invention to the negative pressure mold breeding shelf.

[Drawing 2] It is the crossing top view of the deodorization equipment of the 1st operation gestalt.

[Drawing 3] a part of air cleaning unit of the 1st operation gestalt -- it is a fracture front view.

[Drawing 4] It is the weight rate-of-change table showing the weight percentage reduction of the honeycomb-like charcoal filter by thermogravimetric analysis.

[Drawing 5] It is the graph which shows aging of the odor component amount of adsorption of a honeycomb-like charcoal filter.

[Drawing 6] It is the adsorption surface area passage-of-time degradation table showing aging of the BET specific surface area of a honeycomb-like charcoal filter.

[Drawing 7] It is the drawing 1 equivalent Fig. of the 2nd operation gestalt which applied this invention to the positive pressure mold breeding shelf.

[Drawing 8] It is the drawing 1 equivalent Fig. of the 3rd operation gestalt which applied this invention to the closed mold breeding shelf.

[Drawing 9] It is the drawing 1 equivalent Fig. of the conventional technique.

[Description of Notations]

- 1 -- Deodorization equipment.
- 2 -- Breeding shelf.
- 4 -- Exhaust port.
- 5 -- Air cleaning unit.
- 6 -- Ventilation means (blower).
- 16 -- HEPA filter
- 18 -- Filter for dust removing.
- 19 -- Honeycomb-like charcoal filter.
- 23 -- Air supplying opening.

[Translation done.]

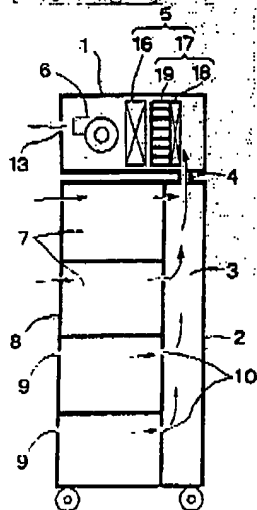
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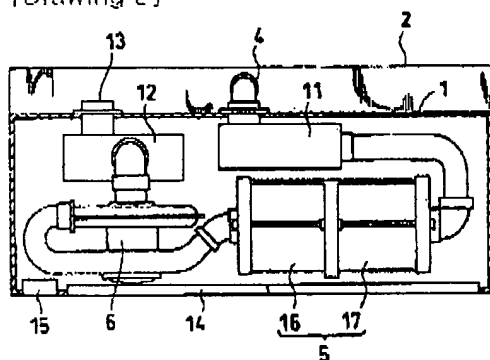
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DRAWINGS

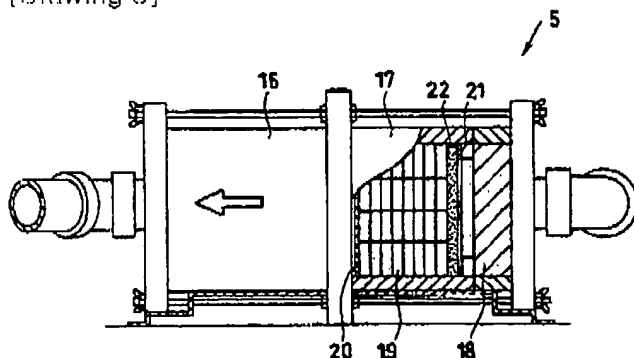
[Drawing 1]



[Drawing 2]

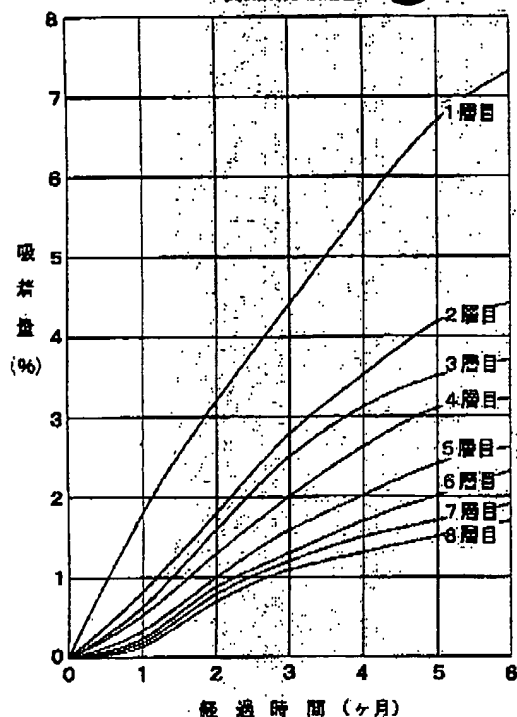


[Drawing 3]



[Drawing 5]

ハニカム状活性炭フィル
臭気成分吸着量



[Drawing 6]

吸着表面積(BET比表面積)の経時変化

(単位: m^2/g)

ハニカム層	1ヵ月	2ヵ月	3ヵ月	4ヵ月	5ヵ月	6ヵ月
1層目	453	338	128	120	57	26
2層目	603	481	441	222	239	88
3層目	653	516	510	482	396	249
4層目	687	698	672	559	458	349
5層目	758	706	700	597	568	490
6層目	765	714	713	700	585	580
7層目	798	727	713	710	601	600
8層目	816	731	731	717	618	617

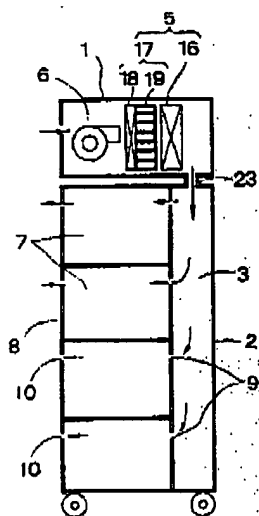
[Drawing 4]

熱重量分析によるハニカム活性炭フィルタの重量変化率

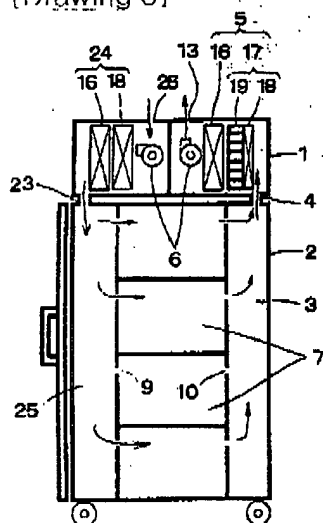
(単位: %)

ハニカム層	1ヵ月	2ヵ月	3ヵ月	4ヵ月	5ヵ月	6ヵ月
1層目	2.7	4.1	5.3	6.5	8.2	8.2
2層目	1.7	2.5	4.3	4.4	5.1	5.3
3層目	1.5	2.3	3.4	4.0	4.2	4.6
4層目	1.4	2.3	2.8	3.3	4.0	4.1
5層目	1.1	1.7	2.5	2.9	3.1	3.5
6層目	1.1	1.6	2.2	2.6	2.8	3.3
7層目	1.0	1.3	2.1	2.3	2.6	2.8
8層目	1.0	1.4	2.0	2.2	2.4	2.6

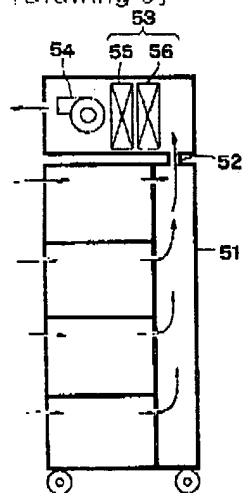
[Drawing 7]



[Drawing 8]



[Drawing 9]



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